

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

CUMBERIAN METALLURGY—No. I. THE GREENSIDE LEAD MINES.

We purpose to describe a few of the metalliferous veins in the North-West of England; not confining ourselves to the political boundaries of Cumberland, but embracing places comprised in the same geographical area. The Greenhead Mine, in this district, in point of quantity of lead, is the most important. Situated on the southern slope of the Greenhead, this vein has for nearly a century been a source of profit to the fortunate adventurers. The lode is stopped away in its upper portion. Two main levels are worked along the course of the vein for nearly 300 fathoms. The ore, rich in silver. From these levels the galena is raised for many years. Lately a third level has been opened below the other, but, unfortunately, a large portion of the vein is occupied with barren rock. In entering this level through several fathoms of most excellent ore, we find, we understand, of any part of the mine. Next to the ground, above referred to, for 200 or 300 yards, we reach good ore ground for a few fathoms more, and then on the dead ground, beyond which the lode shows no metalliferous, nor has any systematic effort yet been made, as we know, to try the ground further. The vein passed through in this level communicates upwards, and, into the extensive lode worked upon in the two upper levels, downward they seem to keep a good strength, so far as is concerned. When the upper portions of the vein are compared with a smaller number only of miners can be employed upon pillars upon which the main body of lode seemed to rest, unless compensating discoveries are met with at the same time, the output and value of the mine. Or, to put it, "The vein was evidently standing on

in 1871 was 1912 tons of galena, which yielded 1434 lb of 28,000 ozs. of silver, or an average of 20 ozs. to the ton, nearly double the average of the Cumberland mines. In the peculiar cutting off of the vein stuff, as above mentioned, produce of ore has not kept up, and the profits will, in the year just closed amounts to 1500 tons of lead and 100 tons of silver. A remarkable feature in this mine is the same in the neighbouring mines—is the great amount of argentiferous galena in the upper portion as compared with the lower part of the vein. The yield at present is in the level 17 ozs. of silver to the ton, in the second level the lowest adit it scarcely exceeds 6 ozs. The present yield, however, need not seriously or permanently affect the mine. There is every probability that both on the upper and lower levels the vein will again be productive; and the company's wisdom by pushing vigorously forward explorations in the lower levels, and especially in depth.

The floors are well laid out. Hand labour and waste are at a minimum. Blake's crusher is in use, and seems to work in a very satisfactory manner. The jiggering is done by a water-wheel, and a rough jerking motion is given to the suspended grate of ore matter, by means of a lever on the shaft, which catch the end of a lever from the handle. This arrangement seemed to us inferior to the eccentric cams on the shaft, which is in operation on the machinery less severe. The motion is less violent, and the machinery less severe. This system also admits of gradations on the same shaft, by varying the eccentricity of the cam, and can be reduced for the most part to an almost impalpable shimmering. In the works of the mine about 20 such machines are worked upon the shaft of them being so arranged as to have a gentler motion.

An arrangement has been adopted to deal more effectually with the waste. Water is driven at a strong pressure into the bottom of the containing impure smidmud, with a sufficient force to drive over the edge the fine slimy matters, whilst the heavier particles of the water, and continue in the vessel is emptied the ore is found to be thoroughly washed, and the overflow goes to the buddles. Those at Greenhead are arranged for economy of water and labour. The waste water is conducted along wooden troughs, fitted with sluices, so as readily to admit of the supply being turned on to some other buddle, whilst the results are very effort is here made to avoid loss through the use of the impalpable powder to which portions of the waste are reduced during the crushing operations. The first buddle are divided into three portions—the first goes to the ore heap; the "middles," which go to the second buddle for re-buddling or thrown to the waste heap, according to the quality. The oblong German buddle is not so good as the inferior in separating power to the better buddles, we think, for its economy of labour, that it is produced with advantage into many of our English neighbouring mines of Nent Head buddling is carried on here. Here Zenner's buddles are used, and also the fine spray of water, almost as fine as steam, is used to be the separation of those minute particles of waste which usually find their way, from their extreme fineness, often, indeed, get carried off into the brook course. The buddles are fitted with spray producers, but of a different kind. Indeed, the whole subject of preventing loss in the operations of this country we regard as capable of considerable improvement; and we further would recommend to the lead-dressers the remarks of Mr. N. Ennor on these matters in the Mining Journal, which, though mainly directed to the separation of other minerals. The dressing of the ore at these works is smelted on the spot. The ordinary reverberatory furnaces is employed, known in books

as the English lead furnace. Latterly the form of furnace known as the Scotch hearth has found more favour. This is a cast-iron hearth, of 2 or 3 ft. square, enclosed in a mass of masonry, varying in its details to suit the nature of the ore and fuel. An essential condition is the sloping channel in the sole of the hearth, to allow the liquid lead to run off as soon as formed. The smelted metal is uniformly purer by this than by the English process, chiefly on account of the lower temperature employed, which fails to reduce the foreign matter present in the ore, and which would contaminate the lead.

The flue is an important part of the smelting establishment. At these works the chimney has been extended at various times. At present it is 8 ft. by 9 ft., and about 1½ mile long. The oxide of lead is carefully collected at intervals, and reduced to the metallic form, in common with the litharge produced by cupellation. The amount of metal obtained from the dressed ore is as follows: From first smelting, 65 per cent.; from reduction of slags, 5 per cent.; from oxide from flue, 4 to 5 per cent.; making a total of 75 per cent. This figure, which appears tolerably good from a theoretic value of 84 per cent., is greatly eclipsed by the produce of the Stanhope Smelting Works. Here they obtain 66 per cent. from the first fire, from 4 to 5 per cent. from slags, and as high as 10 per cent. from the flues. To accomplish this a peculiar form of condensing chimney is used. The flue is large in section, and the draught, consequently slow. It is still further impeded by the introduction of brushwood and discs into the chimney, against which the sooty matters dash, cool, and deposit the oxide. Along the top of this horizontal flue runs a tank, perforated with very fine holes, to allow water to drip through at intervals, and damp the brushwood and other obstructions in the flue, thus causing the oxide to adhere. To make the supply of water in the tank intermittent, an oblong vessel is fixed immediately over it, capable of turning on an axis. The vessel is first fixed slightly sloping, and is supplied by a small pipe with a gentle stream of water. At the end of a certain time enough water has accumulated in the lower part of the vessel to overbalance it, and precipitate its contents into the tank below, which, by means of the fine holes below, would damp the interior of the flue; the water vessel meantime would, after discharging its contents, right itself again, by the force of gravity, to recommence the same intermittent action.

THE CUMBERLAND COAL FIELD.

SIR,—Your correspondent writing from Carlisle in the Supplement to last week's Journal is quite right. I am not a native of that district, and have only got what knowledge I have of the district from occasional visits to it, and from books. He gives a quotation from the Carlisle Journal of Sept. 28, 1867, where it is stated that trials were made for coal at a point about two miles from Carlisle, and a seam of coal was found 4½ ft. in thickness. If your correspondent can inform us at what depth this seam was found, and how far it extended, and also what depth the bore-hole is put down which he mentions in the bed of the Eden, it might prove very interesting.

It will be seen from my former remarks on this interesting and very important subject that our opinion is that bore-holes have not been put down to a sufficient depth to prove this strata. The depth of the best seams near Maryport are from 130 to 150 fms., and good seams may possibly lie at a depth of 200 or even 300 fms. about Carlisle.—Newcastle, July 4. M. E.

COAL MINES REGULATION ACT, 1872.

SIR,—Referring to the letter of our friend, Mr. Hall, in the Supplement to last week's Journal, who I must say has always given your readers a clear definition of the different parts of the Act of which he has written in your paper; but thus far it does not appear to rest with the clear meaning there laid down, neither by the Act nor the circular since issued from the Home Office. It appears that those in authority at the Home Office have power to refuse to grant certificates on application and proper representation of facts being given in accordance with the meaning of the Act. What then can men do? They become powerless, and apparently useless; there is nothing left for them but to retire from their situation. I will give you an instance without mentioning names, which I could do, several having occurred in this district. A man having been, and is yet (though without certificate), manager at a large colliery for upwards of 20 years. This man has made application in accordance with the requirements of the Act for a certificate of service, and has received official refusal; the same owners under whom he has so long served are wishful to make him their certificated manager; under those circumstances I cannot see, with Mr. Hall, the appearance of any false conception of the protection held out to the owners.

I would ask, in the true meaning of the Act, why should an owner be held liable for the non-appointment of a "probationary" manager when he has already a good and tried man, who has served him to his (the owner's) satisfaction for 20 years, and the same man being in every way according to the Act eligible as holder of a certificate of service? Mr. Hall again says, "but I think that wherever the special rules of a district have constituted any man a manager," &c. How can the special rules constitute a man a manager under the Act? It is the granting or holding of a certificate that constitutes him manager. The impression is general in this district that a manager has no right to sign the new special rules unless he be a "certificated manager;" therefore, for want of "certificated managers," the new rules are not issued, or even posted up in or about the mine, as required by the Act, and the reason why the certificates are not issued rests with the Home Office authorities; therefore, in justice, putting the law on one side, how can a man be liable to any authority when that same authority refuses to allow him to do that which the law says it requires you shall do? With all due deference to your able correspondent, Mr. Hall, I beg to say that correspondent, "Middleman," did in his letter in the Supplement to the Mining Journal of Jan. 11 express the opinion of that class of men in this district.

ONE OF THEM.

DIRECT CENTRAL-LIFT STAMPS.

SIR,—Since I read Mr. Rowland's letter, in last week's Journal, respecting the concrete having failed to stand the hard blows of the central stamps, I began to think whether they had mixed the material properly, as it stands all right at other mines. I accordingly

waited upon the secretary, and asked him if he knew anything about it. He read me the letter, and it goes on to say that when the trench was ready, and a great part of the lime, gravel, and sand had been properly mixed, and thrown in, there came such a flood of rain, filling the trench, and, of course, spoiled the lime, and hence the failure, so that, in fact, it was no concrete at all, worse than mere mortar. Well, it will be a lesson for the future, as I find it very difficult to get anyone to believe that the foundation requires to be so very solid.—James-street, Old-street. J. WALKER.

THE NORTHERN INSTITUTE OF MINING AND MECHANICAL ENGINEERS.

SIR,—A great calm appears to have come over this powerful body; no doubt, however, they will wake up soon, and the viewers and mining engineers may well be excused when it is considered that they have at present the New Mine Act and its introduction to contend with. When this Institute was first established it was an institute of viewers and mining engineers purely, the late Mr. Nicholas Wood being the first President, and during the period when he filled the chair, which continued many years, a large number of practical papers were produced of a most valuable kind, bearing upon coal mining, the mode of working coal, of ventilating mines, underground haulage of coal, &c. The most prominent members of the Institute during the first years of its existence have nearly all passed away. Mr. Nicholas Wood, Mr. W. Anderson, Mr. W. Barkus, Mr. T. J. Taylor, Mr. Atkinson, Mr. T. V. Hall, all of these are gone, and some prominent members have removed to other districts, which prevents them taking any active part in the affairs of the Institute. By the way, it appears to be remarkable that in the Wood Memorial Hall, the splendid building in which the meetings are now held, only one statue has yet been erected—that of the first President; surely busts at least of many others ought to be added. Many of them deserve to be remembered.—Mr. T. J. Taylor, Mr. Hall, Mr. Atkinson, and others.

The Institute at present presents a marked contrast to the earlier Institute, when the members were simply viewers and mining engineers; now they may be divided into several classes—mining engineers; viewers, mechanical engineers, metal brokers, merchants, mine agents, and general agents, and last, but not least, professors, real great philosophers, these being connected with the College lately established in Newcastle. The society is in too flourishing condition, but we fear that it is getting far too cumbersome and heavy to work well; far too little discrimination has, we submit, been exercised in admitting members. The society for all practical purposes ought to have been confined to mine managers, viewers, and mechanical engineers. Merchants and general agents really have no right there, and the reasons that induce them to join the society are obvious enough. It is to be hoped that the practical coal miners will keep their heads up in this now gigantic institution; if they do not another institute will soon be wanted in Newcastle. The coal of the Tyne and Wear basins is the foundation of the great and ever-growing wealth of the district, and it must not be supposed that we have arrived at anything like perfection in the art of coal extraction. It is a question whether many other districts have not already outstepped us in the race. Very little progress has been made here yet in long work, in getting coal by mechanical means instead of hand labour, and even mechanical ventilation has as yet made little progress here. There is some reason to fear that the oldest coal field, or the managers of the works thereon, have fallen into a sort of lethargy. With respect to the Institute, the practical miners who are members ought to contribute liberally papers on improved modes of working, and especially on working coal by mechanical means, and many other topics if we are to keep abreast of the times—as to keeping in the van, that position is we are afraid almost lost now. Newcastle-on-Tyne, Feb. 5. AN OLD MEMBER.

N. ENNOR ON TIN DRESSING AND SMELTING—No. IV.

SIR,—I next take up No. 3 letter (dated December 28). In that I showed that tin may be and is reduced to slime, small particles, and atoms, and sent down any river, even to the sea. To do this I contend that extra large heads are used. They are worked slow, and the tin is pent up with small upright grates, of not above a fourth of the proper size. It is only to be compared to a felon pent up in a jail, and told to stay where he is, and he shall not come out until he is stamped to fine slime and fine particles. We care not how much goes off in atoms to sea, as no one can see them. The old stamps grates give the rough tin no chance to get out; it is bound to fall back and settle under the heads, and I see no proof that the best tin may not remain there for a week, or until it is stamped to atoms. The best tin is the first that goes to fine particles and atoms, and then the troubled waters take them to sea, and from there to the Atlantic Ocean, and lost for ever. I am aware it is now the custom to stop an hour or an hour and a half at midday to clear the grates. I recently looked on while they were doing so; the grates then had not above 3 or 4 inches clear. It might be said by a looker-on that it was only foul water that escaped, but it is foul water that carries off particles and atoms. If we suppose the tin stamped from these mines to contain from 1 to 2 cwt. of tin to the ton, I argue you should have three times the sized grates, twice the sized holes, and a quicker movement with the stamps, so as to let everything escape as quickly as possible. Everything coming from the stamps should pass to a self-acting jigger, close outside, and through two if required, the bottom of the sieve to be the largest size. Your practical agent and dresser knows the size which would best suit the tin that goes through. The ragging would be chiefly hitch tin; all the rougher tin, and what contained hitch tin, would stop in the sieve, if not in the first it would in the second, the waste still passing on to a round revolving griddle, from it the slime passing to one buddle, and the rough waste to a second one. Many may argue that there would be hitch tin in what goes to the rough buddle. I believe it would be found too poor to pay for handling over again, and the slime would not be half the present quantity—not above one-fourth; then the best round tin would be found in the hutch, and of a much larger size than is now produced. These hutches should be self-acting. What was retained in the sieve would be chiefly round grains and hitch tin, I should say worth 5 or 6 cwt. of tin to the ton. Pass this through a good rubber, or a properly made stamps, with a jigger machine and deep slime pits, one for day and one for night, and run off the clear water after

12 hours standing, as this would be far better slime than from the first stamping. It might be argued that this would require a second stamping; this I admit, but it would be only a very small portion, as this would be best work. I notice your round buddles are worked badly. You work the rough and slimes together from many of the stamps. Slime should be divided from rough as soon as possible, and worked by itself, otherwise the rough will carry slime off with it, even round particles of tin, such as is caught by the squatters. Where does good tin come from to them else to pay but in the slime? I may ask the squatter tin dressers if they could not catch all the hitch tin which comes down the stream to them by self-acting jiggers in the running stream, and if they think what passes through the jiggers would pay them for going through stamps after? The foregoing remarks refer only to tin requiring but little burning.

I take contaminated tin ore in my next. In answer to this letter someone replied who appears to know what he is about. I only differ with him on one point, that is fine stamping. I say still stamp rougher, and catch the rougher hitch tin in self-acting jiggers to rub down or re-stamp. In doing this you will catch tin of more value and far less cost than if you stamp it to slime; in fact, I argue that you will retain tin of far more value to the smelters. A second person remarks that I said the mine agents are concerned with the squatters. I think he will on reference to my former remarks find it *vice versa*, but I argue that it should be practical men to take up these subjects, men who actually do know tin by the light of a candle and in a poor air mine. As my object is to get the opinion of men who are masters of these subjects, and not to let in such men as the late rather shrewd American to criticise, as it is bad. I say we have still able and practical men left in Cornwall, and I am doing my best to lead the way and draw them out, when I hope we shall devise means to make the required improvement among ourselves, and not be beaten by outsiders who have had no practice and do not know tin. I may notice we have a great many men coming out with new stamps, none of whom know tin, still these men certainly have a claim of erecting stamps, as they all style themselves professors and engineers; if so, they have an undoubted right to try their hand at stamping. I wish them luck. I shall have to touch again upon this some future day, but I do think I must omit replying to even miners or others who have had little or no practice in tin mining and dressing contaminated tinstone, as it requires a thoroughbred practical miner to know tin—men who know tin and how to treat contaminated ore after they found the mine which contained it, and how to stop tin from going to the sea. It is admitted by the best mining authorities that the agents of mines which empty their refuse into the Red River are the best tin miners of the day; they are known practical men, born and bred I may say in these very mines, and many of them have had to do with cleaning tin all their lives, and with all their skill they know they are letting too much tin go down the Red River to the sea. After I have fairly opened the way I have not the least objection for the would-be experts to take up this gauntlet, and try their hand with those men who are good practical tin miners. A few of them may have some self-conceit about them, and I know such men are stubborn customers, and it will require men who know tin to take it out of them.

TREATING LEAD SLIMES—THE MENDIP HILLS.

Sir,—The letter in the Supplement to last week's Journal from Mr. Walker seems strange to me. He says he never heard of me. Strange as this appears, it may be true. In return, I say I never heard of a Mr. Walker being on Mendip Hills, but when I was officially called in I was informed that the mine he alluded to had been worked by a Mr. Johnson and others, under the management of some would-be practical, who sank two new shafts on the back of the lode, and attempted to wash and smelt ore until they ran the company so many thousands of pounds in debt that they were glad to get out as best they could, as they neither knew how to catch the slime or smelt the lead. So as to half pay expenses, they adopted a plan, as this gentleman says, of washing out the slime and picking out the old slags by hand. The slime they washed out was sent into a hole, commonly called a swallet; from there it washed for miles underground, and came out into Cheddar fish-ponds and filled them, for which the company had to pay damages. I have taken samples from these ponds since, producing 8 per cent. lead. Then they smelted their slags without a sufficient length of flues, and the lead was carried over the adjoining lands to such an extent that an action was brought, and the company had to purchase all the land; this wound them up minus of a sum which the Journal of that date will show. After this it came into the hands of the late company, when Capt. Harper and the engineers, and all concerned, were discharged. As a matter of course, the former company gave them a very deserving character. After this I was called in to advise, and Captain Hornblower to manage and smelt the ore; and your Journal will also show we soon brought the mine into a dividend-paying state.

With reference to my lawsuit, and the slimes and smelting referred to by me, it was on the Mendip Hills, near Priddy, and was carried on by me solely on my own account. I was in the law court about 40 days, and came out with all my law costs paid, and nearly 20,000*l.* in pocket. What can Mr. Walker say to this? Will it awake him out of a trance? N. ENNOR.

MINING SECURITY.

Sir,—It is supposed on all hands that an investment in any mine is fraught with most uncertain results. To a certain extent there is truth in this belief; but, on the other hand, the total loss by British Mines is not so great as in Foreign Bonds, Mortgages, or Government Securities. In the latter item alone the sum total lost at the moment of writing amounts to (as far as English investors are interested) 40,000,000*l.* sterling. But one-tenth of this sum will be fully in excess of the amount lost through mining failures. There is, indeed, much knowledge, judgment, and discretion to be employed by adventurers in mining speculations, and it is, perhaps, those only who are wanting in some one or all of these qualities, and also engaging in investments whereof they are ignorant, seem systematically to lose and mislead. There are in England 107 copper mines, of which 30 pay dividends; tin 142, of which 39 pay dividends; silver-lead 36, 5 give dividends; and lead 85, of which 17 pay dividends. The following are the degrees of profit (the fractional representation unreduced):—Copper .250, or 30-107; tin .275, or 39-142; lead .200, or 17-85; silver-lead .139, or 5-36; lead and silver-lead .182, or 22-121; British mining .246, or 91-370.

Thus, of all mines, copper mines are the safest for profitable investment than tin, lead, and silver-lead, and lastly silver-lead. An intending investor will find his money safer in a quiet steady-going mine, rather than one much in brokers' hands. Thus, the Trumpet Consols (tin), which is seldom seen in any broker's list, is perhaps as safe a mine, as it certainly is one of the most ably managed, as any British or foreign adventure. A mine of this description is, however, quite appreciated by its shareholders, and, as I myself have found to my disappointment, shares are seldom met with to any extent. Instances might be given, no doubt, of other mines of this description, but this example is fresh in my memory, having lately been courteously conducted over it by one of the gentlemen in charge. Progressive mines should, in all instances, be thoroughly inspected by the intending adventurer, either personally or by a competent person, if possible, of the district.

Of Foreign Mines, the most numerous are in gold, of which there are 40, 8 pay dividends, the whole 8 selling for 1,140,000*l.*, as against 1,600,000*l.* English tin and copper; in lead there are 5, of which 3 are profitable; silver-lead 4, of which 3 pay dividends; copper 18, 8 pay dividends; silver 25, 10 pay dividends; 1 tin mine, it pays dividends; 1 zinc mine, it is unprofitable. The following is an analysis of the whole (fractional representation unreduced):—Lead .6, or 3-5; silver-lead .75, or 3-4; copper .444, or 8-18; lead and silver-lead .333; gold .2; silver .4. Thus, in foreign mining we find lead, silver-lead, and lead and silver-lead together, transposed (if we omit the solitary tin mine) from the bottom of the list to the top; then in order of safe investment copper, silver, and gold. The position of the precious metals on the list, and the selling value of

even the successful "gold mines," may be noteworthy to any intending investor. H. SCHULTES SCHULTRESS-YOUNG. Knowlins, Bovey Tracey, South Devon.

ECONOMY IN MINING.

Sir,—We hold the opinion that economy in mine management is now-a-days the chief essential to success—not a cheese-paring, grudging system of economy, as is practised in high places at the present time, but a liberal spirit regarding improvements in practical mining, a readiness to profit by every saving in expenditure that genius and knowledge can effect, a steady desire to utilise as far as possible the natural resources of a property, and a thorough and sincere determination on the part of an executive to expend as small a sum annually as is consistent with the true interests of an enterprise on purposes not immediately reproductive of a return. One of the principal causes of the failure of foreign mines worked by English capital has, without question, been the money recklessly squandered in London management expenses. Take the case of the Taquaril. How much of that 100,000*l.*, so soon dissipated, ever reached Brazil, and how small a portion of the meagre sum landed at Rio ever found its way up country? We find the same thing, in a greater or less degree, repeated in the majority of the foreign mines on the London market. Why, the London expenses of the Emma alone are sufficient to vigorously work a dozen British mines! And we may also see, on a smaller scale, a great deal of waste and extravagance in our mines at home. In directors' fees, in London office expenses, in the too liberal payment of too many officials, in extravagant working of mines, in the use of old-fashioned machinery and dressing appliances, where as much metal is lost as is raised, and in other things too numerous to mention, are often dissipated the profits which would give a handsome return to the shareholders. So generally do these abuses obtain in mining, that we are assured your readers will feel equally interested with ourselves in taking note of an instance where these obstacles to success have been avoided, and in which it would seem every pains have been taken to economise capital and discontinue useless and unproductive expenditure. We refer to the Denbighshire Consolidated Mines, the report of the meeting of which appeared in your last issue.

Before commencing an examination of the accounts we desire to pay a well-deserved compliment to the manner in which they have been prepared. A more exhaustive, clear, and complete balance-sheet was never presented to any meeting of shareholders than that prepared by Mr. E. J. Bartlett, the secretary of the Denbighshire Mines. Having said so much as to the balance-sheet, we will take its items *seriatim*. Beginning at the fountain-head of all failure in mining—viz., extravagant payments to vendors—it is satisfactory to find that, out of a capital of 18,000*l.*, in 3*l.* shares, the cash payments on account of purchase of mines was 277*l.* 5*s.*, of the total sum of 10,027*l.* 2*s.* disbursed in accordance with the terms of purchase, the vendor accepting 9750*l.* in shares, so great was his confidence in the success of the company. So much for economy in the most vital point of a company's history. The legal expenses generally run away with a good round sum; the entire law charges in connection with the leases and registration were 170*l.* The cost of machinery and plant (including a 26-in. cylinder pumping-engine, winding-engine, pitwork, &c.) was 1357*l.* 2*s.* 6*d.* We cannot judge of the economy in this department by the figures; true economy would look rather to efficiency and adaptability. On this head it is sufficient to say that existing arrangements are so complete that, notwithstanding the recent heavy floods, and although the fall of rain has been almost unceasing, the engine has at no time worked at more than six strokes per minute, and the water is now so far conquered that a speed of three strokes per minute is ample. The amount expended upon the mine, &c., up to Dec. 31 has been 1314*l.* 9*s.* 6*d.*; and, although we might fairly expect in the first year of a company's existence a large outlay in London, which would not be likely to be repeated, the small sum of 233*l.* 19*s.* 8*d.* represented the whole of the outgoings under this head. Nor are the amounts expended in London and at the mine given as lump sums. Of the 1314*l.* 9*s.* expended on the mine 251*l.* 14*s.* 6*d.* have been spent on shafts, 71*l.* 4*s.* 4*d.* on levels, 81*l.* 13*s.* 4*d.* on rent, 80*l.* 19*s.* 11*d.* on sawyers and carpenters, 63*l.* 12*s.* 11*d.* on smiths' work, 101*l.* 16*s.* 11*d.* on sundries; tradesmen, 398*l.* 0*s.* 3*d.*; incidentals, 8*l.* 4*s.* 7*d.*; carriage and horse work, 67*l.* 4*s.* 4*d.*; and wages, 184*l.* 7*s.* 11*d.* As making the total of London expenses printing and stationery figure for 30*l.* 8*s.*; eight months' office expenses and salaries, 100*l.* 16*s.*; interest paid to shareholders on calls in advance, 5*l.* 5*s.* 8*d.*; travelling expenses (four journeys to the mines, including attendance at the Maes-y-Safn sale, where the machinery was bought an excellent bargain), 45*l.*; and directors' fees for six months, 52*l.* 10*s.* The assets are:—Cash at banker's and at call, 1152*l.* 5*s.* 6*d.*; and reserve of shares unissued, 3750*l.* Of this latter amount 500 shares were issued at the meeting, and at once subscribed for, for the purpose of purchasing an engine to develop the western portion of the sett. Thus the total assets were 4902*l.* 5*s.* 6*d.*, and there was not a single liability of any kind or description.

The progress made in developing these extensive mines, sinking operations having been commenced only in May last, is truly surprising, and reflects the greatest credit on the executive, and affords reliable grounds on which to base hopes of a bright future. The present depth from surface is 124 yards, and pumps are fixed to the 112. The great bulk of lead which was raised by former workers was from a course of ore starting almost at surface, and dipping rapidly east. The indications of an early intersection by the 112 in a few yards further driving of the run of ore are most powerful. The lode is 4 ft. wide, composed of carbonate of lime and small specimens of silver-lead, as if the miners were at the point of entering the course of ore which is known to exist. To further ascertain how far the discovery might be relied upon as being of value, the agent cleared out the 72 yard level, and this proved, in the words of Capt. Pryor, that the ore had been followed in a peculiar way, and had not the produce proved rich it could not have paid in the unminner-like manner of exploring adopted. For the whole distance down this incline the lode presents indications which point unmistakably to good results; for many yards the vein is still standing, and in places will turn out to be worth 15*l.*, or 1 ton of ore, per fathom, which can be taken away immediately the rise from the 112 is communicated, which is a matter of a very few days.

Capt. Pryor says—"Great satisfaction can be expressed at this point, as if the former workers could afford to leave much valuable ground, our chances must be exceedingly good in meeting with a splendid discovery at the 112. To better explain, we may add that under the old system it was impossible to work this ground, hence its existence. The engine-shaft at that period was not sunk, and no machinery existed. In the 112 west a pump was discovered about 140 yards from shaft, sunk 11 yards. The same has been cleared, and six men placed to drive east upon a lode 18 in. wide, composed of spar and lead ore; at present it will turn out $\frac{1}{2}$ ton of lead per fathom; the character of the ground is good. In driving the upper levels nothing of this has been seen, thus proving to our minds that it is a new run of lead ore. From very recent drillings it is found that the lode is taking a well-defined course, and will form a junction apparently with another vein to the west, where a great deposit of ore will, without question, be found."

Parry's shaft is now 27 yards deep. In less than 25 yards further sinking it is believed a great body of ore will be met with. To vigorously work this portion of the sett a new portable engine will be purchased immediately, and for this outlay the agents feel every confidence that the shareholders will be richly rewarded, as the ore reported as left is undoubtedly a fact, and the unanimous feeling with all practical mining authorities in the neighbourhood is, that in this part will be opened up one of the richest mines in the Principality. The sett is most extensive, being nearly 1 mile long on the course of the lode, and $\frac{3}{4}$ mile in width, and possessing veins that have already produced hundreds of tons of lead ore at shallow depths; therefore, there exists the greatest encouragement to develop the property energetically, and to push on as many points as possible. The policy which animates the directorate as to the working of the property is one which will commend itself to every thinking man, whether he be a practical miner or simply an investing shareholder. In the words of Mr. Bartlett at the recent meet-

ing, "We know that slow mining is a great waste of money, and having such a sett, large enough for two or three companies to work, and possessing capital, I do not think the directors that they will at all have come up to the requirements of the shareholders until they have put every man they possibly can into the workings. We have now 40 men employed, and I hope to announce in the course of a few weeks that we have 100. Knowing we possess a good mine, the best way to account is to develop it quickly."

The future of these mines, in our opinion, is assured, every essential to complete success—inherent wealth, economical management, a small but ample capital, and a market for their produce. We do not pen these remarks with a desire to puff the shares; they will in due time without fail from us attain their proper position in the market—1*l.* 10*s.* a share—but from a strong wish to keep the surplus cash in the hands of the shareholders, where it may be laid out to far more than abroad. The Denbighshire Consolidated Mines, though one, are by no means a solitary instance of a sterling investment. We need not go out of Wales to mention a dozen. Van Consols, now close on the realisation of the most wishes of its shareholders; there is South Merilyn, with a capital of 5000*l.*; there is Gorsedd and Celyn Level; the Esgrair Lle, well managed, and with prospects of the highest; there is the old Bog Mine, in Cardiganshire; and close to this is Tyllwyd, of which Capt. Walter Eddy reports favourably, and which will be brought before the public in a very short time, with a capital of 12,000*l.*, in shares of 1*l.* each, an amount the middleman, in the case of a foreign mine, would deem beneath his notice. It is too much the fashion to decry the of our own country in every branch of society, and in no more than mining, whereas the truth is, if developed with prudence, honesty, and economy, there is no industry more quickly or more largely productive of large profits.

Gresham House, London, Feb. 5.

HARLAND

LOSSES IN THE DRESSING OF ORES.

Sir,—When I first read your Glandore correspondence in last week's Journal, I thought they were incited by some one else had written; but it afterwards occurred to me, on notes, that it might have been my letter of the former week, which gave him umbrage, and provoked that piquancy of style—more piquant, I may say, than perspicuous; but, however, he, others have as good a right of judging as myself. It is surprising, from the narrowness of mind he betrays, that he should that an unqualified negation requires no proof. The mind of the assumptions of one party by another does not require a den of proof from the side whence the assumptions come; your correspondent is desirous of exhibiting what he knows subject, I will, with your permission, provide him with a to his performance. I deny that any propositions which have been published in the *Mining Journal*, in reference to the of any practical value; but, on the contrary, if adopted, lead on the one hand to additional expense without corresponding benefits, and on the other to an increase of the losses commensurate. It will devolve on those who contend for the opposite to some proof in favour of the assumptions they maintain. To do regard the expression of their opinions as synonymous facts, nor their mere assertions as the deductions of reason, an indulgence may suffice to gratify and flatter the vain self, men, but will answer no end beyond the province of self-governance.

To lessen the losses in the dressing of tin it will be to alter the mode of its treatment at the early stages. The process of dressing by beginning again at the end, and to such a course either a practical or scientific improvement great an absurdity to be received as the earnest recommendation of any practical Cornishman. I should be glad if your correspondent would take upon himself to state, and in his own name, what ideas or scientific principles have been advanced in the letters which have appeared in the *Mining Journal* on the I am very well aware that it is common for some men to over-vehement and strength of assertion what they lack of judgment; but such a delirium, though sufficient to draw down the intellects, will be ineffectual with others. There are greater mistake than to suppose that the dressing of tin is proved by beginning at the tails, and it is scarcely credible one calling himself a miner should be found who entertains idea. I repeat that no radical improvement can be effected dressing which does not aim at the earliest stages to effect a complete separation of the stuff as possible, according to the gradation from the difference in the specific gravity of the minerals, whether as mere oxides of the rarer metals or as many metalliferous minerals—the ores of commerce.

Liskeard, Feb. 5.

MINING IN CORNWALL—No. II.

Sir,—If I may venture an opinion, some of the best properties in the western part of the county are still neglected, reason for which I cannot tell, unless it is the ignorance relative to them, or the inability to obtain grants. In my referred to the great success of the Mellinar Company, I thought there were properties in the neighbourhood well worth notice. I would here call attention to the piece of mineral ground standing between Great Wheal Alfred and the Alfred Consols on the same lode. There is here a large mineral ground entirely unexplored, and there is no reason why this ground should not be quite as productive as the which have been worked both to the east and west. The ore on these lodes were generally discovered at the surface, continued to a depth of 150 or 200 fathoms, at a great distance each other. Now, in the Great Wheal Alfred the ore dipped westward, and they followed them in that direction they continued, and then suspended operations. I should see an engine-shaft sunk about 300 fms. west of the present of the old mine, where I believe they would have found entirely; it would amply repay those who would venture to do so.

At a little distance to the south of the Mellinar Mine another course of lodes in a most beautiful formation, but face of rather an inviting character. I believe that it is 25 years ago; a slight trial was made here, and copper was market, but for some reason, which I am now unable to mine was abandoned. I remember, about the same time, taking out the foundation of some cattle houses on the of lodes, about $\frac{1}{2}$ mile to the east of this, and came upon of a lode producing beautiful copper, but the farmer who someone would take cognizance of it, and get a grant concealed it immediately. On the same estate a mine had abandoned, by the name of Wheal Kayle. This mine was worked by two different companies, and each working proved successful the trials went. Thousands of tons of ore were raised and sent to the last time of working they sank an engine-shaft, at my father's instigation below the adit, and from this shaft alone they raised ore to the surface. They extended levels east and west of the shaft as far as the ore would then abandoned them. I am not aware that they sank a single vein ground between the levels. Here is yet a beautiful mine for someone have pluck enough to make the outlay.

Adjoining, on the east, is another mine, which was shortly afterwards worked for three or four years, and then given up. This mine was the name of Wheal Carpenter. It is situated in the parish of Gwennol, too well known to need any description by me. About a mile to the west of Great Wheal Alfred and Alfred Consols, going round to the east are the land, Relistian, Rosewarne, and Wheal Hope Mines, which have been largest dividend-paying mines in the county. On the south are the mayne Mines, which were in continual working for nearly 20 years, has been worked by three different companies; the first commenced in 80 years ago, when they erected a 14-in. cylinder engine, and sunk a below the adit, which is 25 fms. from surface. With this mine the adventurers realised a profit of 19,000*l.*, and the mine was given up, were working at 6*s.* 8*d.* in 1*l.*, in consequence of the inadequacy of the machinery, and the half-heartedness of the adventurers. Twenty years the mine was worked by another company, who only sunk 20 fms. without extending any levels except a cross-cut south, to intersect the and having met with a hard dyke of greenstone, were discouraged, and all operations. The last time it was worked was the time above mentioned, 20 years ago. A new engine-shaft was sunk on a counter lode, to a depth below the adit, but this did not drain the old mine, and hence it was there. From this lode alone they returned a considerable quantity of

from the boys and girls working on the floors.

GOLD MINING AND MILLING OF GILPIN COUNTY, COLORADO, UNITED STATES—No. I.

In the January number of the "Quarterly Journal of Science" Mr. James Douglas, of Quebec, Canada, contributes an interesting article under the above heading. The acceptance and publication in a Journal of such high repute is an endorsement of the author as well as of the article itself, hence the facts stated are entitled to the fullest confidence. Of Gilpin County this writer says—"Within an area whose centre is Central City and radius 1½ miles, was discovered before 1863 a gold-bearing lode at almost every hundred feet, and many of these lodes were yielding gold and matter for exaggeration so abundantly that American brokers in the cities of the East were enabled to form no less than 150 public mining companies. It is then said that mills were built by these companies which failed to be profitable after the surface ores were exhausted; yet, notwithstanding this fact, 'a few mines, rich enough to bear the loss of from three-quarters to two-fifths of their produce in the mill, have remained open to testify to the extraordinary richness of the district.' The presence of these mills, representing capital and power, caused them to be used in the history of mining, neither in the number, variety, richness, and local proximity of gold-bearing lodes, nor in the fatal errors originally made and perpetuated by a continuance in this compulsory system of treatment. Since 1865 not less than \$1,500,000 to \$2,000,000 have been washed down to the plains yearly by the water flowing through its crushing-mills, gold, silver, and copper inclusive. It is proposed in this paper to add to the facts so ably presented by Mr. Douglas, from sources of information not readily in his control; and in doing this free quotations will be made from the "Journal of Science."

During 1865 and 1866 there were 195 companies organized in the East, 121 of which were located in New York City. Of these 142 companies had a capital of \$126,551,420. All of them, perhaps, had over \$100,000,000 (the capital of some not being stated in the list). Not less than 10 per cent. of this last amount was actually expended in purchase, in contracts for machinery, in transportation in construction and development. By 1866 nearly all of these organizations had ceased active operations. Some had failed, all were discouraged. The mills, costing vast sums of money, delivered there for 120¢ per ton freight, deliverable now for 20¢ per ton, had failed to treat the sulphuretted ores. The mines were not in fault. Ore from one mine, while the value of the ore was \$20 to \$30 per ton when this metal was reached, failed to yield enough to pay milling expenses; yet the assay value had not changed. Nor were the owners in fault, excepting, perhaps, for the concealment of this difficulty. They made their representations on the yield of the oxidized rock, free gold rock, such as in California and in Australia, but richer. Nothing was said of the virgin uncombed sulphurets which had been reached previously to 1863. The companies shipped California mills; these mills failed on this ore, millions of money were abandoned in these properties, or more money was expended in the fruitless attempts at the introduction of empirical processes. Thousands of eastern men who had been seduced by golden promises, lost heavily, and became prejudiced against Colorado, infecting others with a like hostility. The collapse was nearly as rapid as was the inflation. Colorado lost credit, fame, and the confidence of the people abroad. The residents of Gilpin County were left to themselves with millions of capital invested in machinery now silent and abandoned. The recovery was slow. Here a mine was leased, or a new one worked, there a mill was started up; necessity called up activity. Shut off from the confidence of capitalists, nothing new could be attempted the people must learn to use what was on hand, and they have done so. During these six years the shipment of bullion has slowly augmented, notwithstanding the losses sustained by working the mills, until it reached yearly \$2,000,000, including the shipment of matte. This from an extremely small area, in which nearly all of the most reputable mines have remained unworked. In this time the material progress of the Territory has been truly wonderful, based as it has been entirely on the mineral wealth of the mountain ranges. Cities have sprung into existence, and every requirement of modern civilization is now to be found, where 12 years since the Indian and the buffalo occupied the soil, fully 600 miles west of the extreme verge of civilization. 400 miles of railroad have been constructed, and are in profitable operation. Central City can now be reached entirely by rail from the Atlantic in four days, or from the Pacific in three days; 300 miles of road are projected, to be finished within another year.

In addition to the errors in methods of reduction, Mr. Douglas gives prominence to two other causes, both prolific of discredit to the mines of Gilpin County, when all the discredit should attach to the owners of the mines. One, the subdivision of lodes; as, for instance, on the Burroughs 2247 ft. are owned by seventeen proprietors, two owning as low as 20 ft. each, one 40 ft., one 50 ft., and the largest 462 ft. On these properties there are 15 shafts, the deepest 560 ft., the shallowest 30 ft.—an aggregate of 2804 ft. This is but a sample of the ownership of very many of the most important properties, multiplying the cost of development, and doubling or trebling the cost per ton of ore raised to the surface. The other cause of discredit exists in the fact that the local agents of dev. companies lease the companies' mines to contractors, who, without other capital than their labour, enter into property upon which many thousands have been expended, and with the least possible outlay extract all the ore which may be reached. Millions have thus been extracted, and such mines left in a condition which will require almost millions to put them in safe working order when again opened.

Mr. Douglas observes that the country rock is granite, with some gneiss varieties. In this respect there is, of course, no difference of opinion. Even the mining expert has given his testimony to the existence here of "true fissure veins," the walls usually distinct, and marked often with well polished slickensides. A clay sewage, then a band of almost pure iron and copper pyrites, intermixed with small quantities of blende and galena, or of blende and galena alone, or of all these sulphurets mixed in almost equal proportions, occurs on one or both sides, while the centre of the lode is composed (where the lode is rich) of a gangue of decomposed quartz or felspar, carrying more or less of the same sulphurets. The "average width of the really productive lodes may be set down at 3 ft., but they are all subject to contraction, pinching, or sometimes pinching to a mere thread, at other times bulging into enormous bunches. When the Territorial Assay Office was established it was required that all persons bringing samples to the office should state the depth and width of crevice from which the sample was taken. According to 108 statements of this kind during two years, made for the Gregory district, among which 1 ft. is the lowest and 8 ft. the highest, the average is slightly over 4 ft. Calculations made for other districts or subdivisions will fully sustain this as a safe standard for the width of the crevice in Gilpin County.

Mr. Albert Reichenacker, an educated German metallurgist, made a searching investigation into the value of the Gilpin County ores, and the losses incurred in the mill treatment. Use has been made of his valuable conclusions by Mr. Douglas. The division of ore into first and second class, and the classing of the mines into the best and the poorest, are also retained and quoted:—Value of first-class ore (smelting ore), \$134.50; value of mill ore (second-class) from best mines, \$41.42; value of mill ore (second-class) from poorest mines, \$30.

An investigation of the official records of assays made during two years, and also those of a private office for a like period, taking all assays made, the very lowest as well as the highest, made for every variety of purpose, but mainly for prospecting assays as a guide in the active working of the mines, will sustain the conclusions reached by Mr. Reichenacker entirely by another method:—

District.	No. of Assays.	Gold.	Silver.
Gregory district	139	25.12	9.03 per ton.
Nevada	136	26.55	12.67 "
Illinois Central	39	26.08	19.06 "
Russell	69	18.13	22.12 "
Central City	34	22.69	19.58 "
Eureka	20	27.78	15.16 "
Average value of mill ore by 418 assays		\$40.66 per ton.	
Gregory district	136	143.97	24.58 "
Nevada	64	122.90	29.54 "
Illinois Central	12	119.63	35.53 "
Russell	20	82.88	42.13 "

Average value of first-class or smelting ore by 202 assays, sampled lots sold, \$143.75. An approximation for an average value is all that can be expected. These values, being reached by very different modes, establish a sound standard in regard to both classes of ores. By the same sources of data it is shown that mill tailings, 165 assays, average \$25.01. These samples represent many thousands of tons in piles, tailings made by the active milling of ores for two years. These assays of samples were made from 293 lodes, the average length of which Mr. Douglas states to be about 4000 ft., hence 1,176,000 ft. of mineral lodes actually assayed, from which, as Mr. Douglas remarks, "Gilpin County could probably yield more value in mineral than any district of equal size in the world." And "from mines now open 1000 tons a-day of \$20 ore could at once be produced; and there are second-class mines innumerable, which, under existing modes of treatment, are valueless and closed which would quadruple that yield if it were shown that a \$20 ore could be mined to a profit."

Battery amalgamation and tailing concentration receive attention at the hands of Mr. Douglas. The following is one of the very best and most characteristic samples of battery amalgamation, or result of mill treatment. The statement is entitled to full credence:—

Treated by stamp mill	820.00 tons.
Sold to smelting works	13.27 "
Mill ore assayed per ton, gold	25.13
Smelting ore assayed per ton, gold	131.21
Assay value of all ore raised	26.92
Average yield per ton in currency, mill ore	12.68
Ditto ditto smelters' ore	119.07
Ditto ditto all ore raised	14.17
Gold reckoned at 120 premium, mill ore yielded	40 per cent.
By sale, smelters' ore	62
The whole value of the ore	\$24,965.76
The absolute loss by milling	12,693.38

In regard to milling and then concentrating the tailings, the following statement and calculations may be made, showing that under the very best system of milling, attention being given to saving, and then concentrating the tailings, a loss of 40 per cent. and over is almost inevitable.

The Relation of Silver to Gold.—This relation was unnoticed until attention was directed to its importance by the writer. As an alloy, silver is never absent, but until these ores were handled mines producing gold ores seldom or never produced the sulphide of silver in appreciable quantities. Such ores are unknown in California, and no mention is made of the sulphide of silver existing in the gold-bearing rocks of Australia. Nor is the presence of copper notable in either of these regions, whereas in the Gilpin County auriferous veins, the sulphide of silver, an important element of value, is also the sulphide of copper. It is, perhaps, sufficiently curious to remark that this sulphide of silver accompanies the mineral when distributed throughout the gangue (in mill ore) to a greater extent than it exists in the solid pyrites (smelting ore) from the same vein, as will be seen from the following figures:—In 429 assays, including all ores but the solid pyrites removed for smelting, \$77.65 in silver to the \$100 of gold. In 73 assays of samples, only the

very poorest removed for milling, perhaps 40 tons of the 100 tons, \$70.84 in silver to the \$100 in gold. In 216 assays of smelting ore, solid pyrites being only about 5 per cent. of the ore, \$34.26 in silver to the \$100 in gold. The loss of silver is presented very strongly when the average of the first and second (506) assays is taken—viz., \$74 in silver to every \$100 in gold.

In the bullion from amalgamation there is about \$20 in silver to \$100 in gold; that is, all the silver obtained with the gold in the amalgamation is in the native alloyage. It is a remarkable fact that the average of this native alloyage in all the world is about \$21 in silver to \$100 in gold. Hence, then, of \$74 the mill saves only \$20 in silver; the balance is lost as an alloy with the gold lost, and as a sulphide of silver. A large portion of that \$54 in silver is a total loss, not stopped in the pile of tailings, but, being held in suspension, flows away with the muddy water. The streams show this far away from the mills, the water of which being taken near the surface and settled. The settlings upon being assayed show a notable presence of silver without a trace of gold. The next loss of silver takes place when the pile of tailings is buddled. 229 assays of tailings (samples from piles containing many thousand tons) showed \$28.45 in silver to \$100 in gold.

The loss, then, is \$20 + \$28.45 = \$48.45 saved out of \$74 = a loss in the flow of \$25.55 in the \$100 of gold. And now when buddled this relation again changes. In the concentrated there is by 132 assays \$17.51 instead of 25.43 in silver to the \$100 in gold, hence a loss of \$7.92 in silver to the \$100 in gold in the flow from the buddle. These two losses, then, sum up \$28.57 + \$7.92 = \$36.49 lost in silver for \$100 in gold contained in the ore, or very nearly 50 per cent. of the silver.

Loss of Gold by Milling.—By reason of the sulphates present in the water, which change blende into red, the strength of the solution being increased by piles of old tailings decomposing, and by being run through successive mills in contact with ores in which there is more or less sulphate. Such water cuts up the mercury, helps to coat the gold, whilst corrupting the mercury, and so prevents amalgamation.—2. By escaping particles of sulphurets enclosing atoms of gold, which if not finally caught in the concentrators are wholly lost. A like calculation to the above will show that the loss of gold under the best system of management is about 33 per cent., which, added to the 50 per cent. loss of silver, puts the result in this shape:—

its shape :—

Loss of gold in \$100	\$33.00
Loss of silver in \$74	37.00

Hence a loss out of \$174 of \$70, or over 40 per cent. The loss on one-half of these ores milled in Gilpin County during the last five years was fully 60 per cent. of the contained value of the precious metals, and all the copper, not saved in the smelting ore, no effort being made to save the tailings of this half. It is, therefore, a safe conclusion that fully one-half of the value of the Gilpin County ores is absolutely lost to the commerce of the world in consequence of a defective system in treatment. Mr. Raymond, United States Commissioner of Mining Statistics, reports 100,000 tons reduced in Gilpin County in 1865 9:—

Estimate this ore at \$35 per ton, smelting ore included	\$3,500,000
Out of which 5000 smelting ore at \$100	500,000
Value of milling ore	\$3,000,000
Of which 50 per cent. is lost	1,500,000
Add for copper lost (Mr. Douglas)	450,000
Loss in one year on 100,000 tons	\$1,950,000

[To be continued in next week's Journal.]

PATENT CONDENSED PEAT FUEL.

H. CLAYTON, SON, AND HOWLETT'S PATENT.

Referring to the Supplement of the *Mining Journal* of Jan. 11, under the above heading, after noticing a promising experiment made with a working model, the reader was informed that a full-size machine was being made by the patentees—the Messrs. H. CLAYTON, SON, AND HOWLETT, of the Atlas Works, London, W. We have now to report a successful experiment, on Tuesday, by this machine in the presence of some 50 gentlemen, specially invited to see its performance, and test its productive merits (some of them on their own peat) in any manner they might see fit. The owners of peat bog were well represented, and it was highly interesting to hear them and their representatives arguing the question from their own point of view against some who thought they ought to be thankful if they only could get rid of their bogs on any terms, as the land thus reclaimed would be worth some 30¢ more money per acre. And what rendered the question raised as to the landowners' royalty on dry peat (6d. per ton as it was practically stated, 20s. per ton being the market price) doubly interesting is the fact that on the day of the experiment coals in the metropolis rose 8s. per ton. Had this advance in the price of coal been expressed at the meeting it would certainly have affected in no small degree the commercial balance, turning the scales in favour of landowners. But be this as it may, the advance proves beyond a doubt that the present time is a most favourable one for the investment of capital in this new and promising branch of industry. There are many landowners who are highly intelligent, business men, capable of turning their peat bogs to better account than any private company, and who will not be scared from a sense of duty by hypothetical calculation, as the work can be contracted for at so much per ton. On the other hand, there are doubtless many exceptions whose safe course of action need not be pointed out.

The experiments made were with raw peat from St. Ives, Huntingdonshire. Much of the vegetable matter was very little broken, but rather in an advanced stage of decomposition, and in passing through the machine it was thoroughly reduced to an homogeneous pulp. The machine was driven by a portable engine, but not over 4-horse power was expended. It must be borne in mind, however, that the experiment was exclusively confined to the masticating, pulping, and expressing of the peat—the two ends of the practice, so to speak, being wanting—the hauling of the squeezing trucks from the bog at the feeding, and the actuating by mechanical means the discharging apparatus, so that 2-horse power will be required to work these in the bog; or a 10-horse engine will drive two machines, or a 20-horse engine four machines, where bogs, or rather bottoms, will carry such weights, as such combinations would greatly economise labour, machinery, and plant; but into such details it would be premature to go at present, as each bog, moss, or fen will have its own requirements.

The construction and performance of the masticating, pulping, and expressing machine was highly admired by the meeting, and unanimously pronounced a complete success. Its general mechanism closely resembles in character that class of machinery (brick and tile) for the successful manufacture of which H. Clayton, Son, and Howlett have long been acknowledged pre-eminent. It consists of two conjoined cylinders, the one vertical and the other horizontal. The former has a feeding-hopper, and the latter three discharging dies, 3½ by 2½ in. In each cylinder a shaft armed with peculiar masticating and pulping apparatus rotates, being driven from without by bevel and spur-gear. The blades of the vertical shaft form portions of a screw, and work the peat downwards into the feeding screw-mouth of the horizontal cylinder as they masticate and cut it up. Between the two chambers provision is made for "screening" out stones when present in peat. This is a capital contrivance, as stones would play much mischief with the more closely set pulping discs and blades in the horizontal chamber. Such forms the body of the machine. The feeding-screws work forward the peat into this chamber, on the shaft of which a series of discs are so arranged as to form a double cutting screw throughout its whole length. Hardened steel cutting blades are also arranged that the revolving discs pass between them, by which the peat is gradually propelled forward, and the chamber kept uniformly packed, so as the better to effect the minute subdivision of the whole mass. By the time it arrives at the discharging screw the peat is not only mechanically changed in character, but it also loses the powerful affinity for water which all decayed vegetable matter possesses, so that we are apprehensive some chemical change must take place in its constitution favourable to the process of drying and burning subsequently noticed.

The discharging screw forces the thoroughly prepared peat through the dies or orifices in three continuous streams on to rollers, which carry it forward to the drying trays. Below is another set of rollers which carry the trays to the cutting wires, which cut up the peat into briquettes 5 inches in length, as in cutting bricks. The trays are made of lath, and are light and easily handled, and each holds 21 "peats," seven in a stream. The empty tray is put in below the upper rollers, and rests upon the lower ones, and extends sufficiently far beyond the former, so that the moulded stream of peat lays hold of it and pushes it forward; the moment the stream reaches the tray it is cut off by a single wire, and as soon as the tray receives its load, an empty one is pushed in to catch the flowing stream of moulded peat. When the tray passes the cutting wires it is moved onward down the inclined tramway to the drying rack, into which it is placed. In about three days the moulded peat will be sufficiently dry to be removed from the trays and stacked in drying sheds to complete the drying.

As the peat dries it gradually decreases in bulk, until it finally becomes nearly as compact as coal, and of about the same specific gravity. In this state it remains and will not absorb moisture as

unpulped peat dried in the ordinary way does. The peat has lost this affinity for water as it had when in the bog, and has lost this affinity, as already stated. This is an extraordinary peculiarity of the patent condensed peat that requires investigation it than we can give in this report, and we will prove doubly interesting to the mining world.

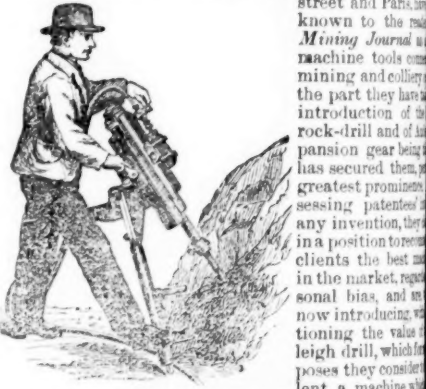
The machine was timed for short trials, the moulded peat was fully weighed, and the calculations made showed that to charge 75 tons of moulded peat in a day of ten hours, prior experiments made at the Atlas Works, 75 tons of peat will yield 15 tons of dry peat, and Mr. Elsom, who has considerable experience in the manufacture of peat in Wales, assisted the Messrs. H. Clayton and Co., to explain the models and drawings of drying-sheds, plant, &c., calculated the capital of 2000¢, will start the whole affair to turn out condensed peat daily.

Of the efficiency and purity of condensed peat in comparison with coal the chemical analyses hitherto made are in favour of the peat. But we would commend a more searching investigation of peat and its properties for smelting and other purposes. Condensed peat was kept burning to show visitors its efficiency and purity for household purposes, and the general opinion was in the highest degree favourable. A supply of condensed peat made under H. Clayton and Co.'s patent will soon be on the present high price of coal will induce all who require a hearty welcome. For smelting and like purposes some bogs may yield a more valuable article than other owners of peat bog should test the purity of their peat, to ascertain which is the best market for it. It is only to be turned to such facts to determine their importance, country where so much coal is consumed in the arts, and the immense areas of peat exist, extending over some 6,000,000 acres, peat averaging in depth from 3 to 40 feet. Landowners, depth of their own bogs, and, as from the above estimate of wet peat yields 1 ton of dry, the calculation is easily made much they can send to market. But they must bear in mind Sir Humphry Davy says—"A soil covered with peat is not only with fuel but also with manure"—i.e., a sufficient of peat should be left at the bottom for mixing with the claimed soil.

THE NEW "POWER JUMPER."

The constantly increasing difficulty of obtaining man anything like reasonable rates renders it more than ever to introduce power-tools; for, even though the quality done be not quite so good, and consequently requires more finishing, the far greater quantity got through in a given more than compensates for the trifling additional increase involved. But in some classes of work power-tools have proved even superior to those worked by hand, and rock-mining and quarrying purposes is fortunately among them, yet the difficulty of combining adequate power with size and the necessary portability, has hitherto caused the rock-drills as ordinary mining implements to be far less than it otherwise would have been. The working of a drill with respect to the quality of the work performed, all is wished; yet, if its application necessitate the use of steam, it will be obvious that there are many places in which its advantages could not be utilised. It will be unnecessary to point out to anyone who has been accustomed to the use of much easier it is to procure steam at 30 lbs. or 40 lbs. per inch, at (say) 1 mile from the boiler, than to obtain it at 80 lbs. at the same distance, the higher pressure necessitates pipes, more costly joints, and, indeed, more expensive altogether; so that it may be accepted as a principle that it is of the greatest practical value which will perform a work with steam at the lowest pressure.

For several years past Messrs. Charles Ball and Co., of



to be better suited to the wants of miners generally than the machine previously invented, and which has the great advantage of consisting of only about one-third the number of pieces, considerably cheaper. The power-jumper, the general character of which will be seen from the above diagram, is the invention of Brydon, Davidson, and Warrington, and is certainly as useful a machine as need be desired. It is much shorter, more readily removed from place to place (in fact, the machine, ready for work, including the tripod, weighs less than any other machine of similar power, and has the recommendation that all stuffing-boxes and parts requiring are dispensed with; it is so simple in its construction that any labourer or miner can drive it, since it is merely a turn on the motive-power and feed the drill; that the compulsory, and that it requires only 30 lbs. pressure, which is less than half that requisite for other drills, and its cost is but three-fourths that of the Burleigh or any other hitherto introduced.

During the past week one of the "power jumpers" had at the Grove Steam-Boiler Works, Southwark (Messrs. Walker's), and has given great satisfaction to all who have used it. Although so readily transportable, it works with vibration, and progressed through a hard block of granite, in a little more than three minutes, the pressure varying during the time from 46 to 42 lbs. to the inch, per minute with 45 lbs. of steam would seem to be a speed that could be relied upon in hard granite. With its simplicity, perhaps the very best evidence is to be seen in the fact that in the course of one morning the jumper was entirely to pieces, to show the interior construction to the time occupied in taking it apart and re-mounting it. The time again did not exceed, making the necessary alterations, time occupied in the examination of the parts by the maker; minutes; the jumper was in full work until the order to turn off the steam and take the machine to pieces. The "power-jumpers" have already been shipped to Belgium, porphyry quarries, and they will, no doubt, be largely used in the mines and quarries of this country.

Some valuable researches on the causes of explosions in damp in collieries have recently been undertaken by Mr. W. Galloway, to yield results of much practical value. Mr. Galloway has shown that a sound wave is capable of causing the flame within the wire gauze lamp to be transmitted to the external explosive atmosphere. He has shown that the firing of a shot in a colliery may determine an explosion, and that communication of flame from the gunpowder, but solely by the sound to a safety-lamp placed in a dangerous part of the workings. An experiment illustrating this point was exhibited by Dr. W. Spence at a meeting of the Royal Institution.—*Athenaeum*.

The Finland mines are said to have produced 1,121,000 lbs. of iron ore in 1871, besides 18,317 cwt. of copper and 851 cwt. of zinc. The amount of 56,685 grammes was washed out in Lapland during the year. *Journal of Society of Arts*.

ENWALL MINERALS RAILWAY AND HARBOUR
COMPANY.

MOUNTAIN SILVER-LEAD MINING COMPANY.

of the previous meeting having been read and confirmed, the Chairman proceeded to read the following report:—

The directors have great pleasure in presenting this their first annual report, which they trust you will consider satisfactory, as although returned to recommend the payment of a dividend, yet lead and zinc are not to be obtained from the property for some weeks past, and our honorary treasurer has to present an offer of 117.7s. per ton. This ore has been from the No. 1, which is happy to say improves as we extend the new cross cut has been completed under No. 1, about 250 ft. long, clearing ribs of solid lead from $\frac{1}{2}$ inch to 3 inches in thickness, we perceive our returns considerably. We have much pleasure in knowing that the long talked of deep adit has been commenced about two months ago, and is now about 100 ft. deep. The ore in the adit is of the same grade as the lode is about 700 ft.; we shall then be about 150 ft. deeper than the lode, and will be able to sink below that level we can get a rich deposit of lead when the adit is completed. The ore in this work is 16 months, and the cost about 700*l*. A winze has been sunk from the No. 1 to the new adit, about 40 ft., showing good lead and zinc, and a few more feet will communicate these workings, when a fine and complete, and perfect ventilation attained. In addition to the adit we have built an office and sleeping apartments for our manager and a store for our powder and materials. The whole of our main shaft is now water-proofed, considerable delay and expense has been incurred, but we must say that it does not yet appear to be so speedily or well as we expected. We have had considerable difficulty in ascertaining the value of the commodity would fetch in the market, and as the price of lead and zinc is so fluctuating, and the expenses are so high, we have valued the ore at the rate varying from 9*l*. to 1*l*. per ton, and we, therefore, at the present time, erected temporary works to wash a few hundredweights of ore, as a sample; taking these as a criterion, it would appear that the ore we have large quantities of it there is no doubt it can be sold at a high price, but considering the small amount of capital we possess, and the small amount of work we have done and shall have to do in opening the mine for

occasionally runs, but poorer ore had been met with, but the latest accounts received from the mine were to the effect that as they had proceeded in depth the lode had increased in thickness, and improved in value. (Hear, hear.)

now, doubtless, there would have been noted a diminution in the quantity of bullion produced from the ore, but that fact he thought could give no just cause of alarm. The quantity of silver would be a smaller quantity, but the yield had been proportionately greater, and the statement was not untrue. He then stated that he had been to the respective value of the ore 12 months ago, and at the present time. When Mr. Maxwell had entered into his duties as manager of the mine the bullion yielded 60¢, to the ton, whereas it now yielded 60¢, to the ton—a very important and considerable addition to the percentage. (Hear, hear.) Passing on from that subject, the Chairman next referred to Mr. Frames' (a director) recent visit to the mines on behalf of the company. During his stay on the property that gentleman had been able to get into the workings of the mine, and to see the management from the report circulated among the shareholders they would have seen that that gentleman has gone into the examination of the company's position and prospects in a thoroughly searching, investigating spirit. And as he had no optimism in his nature, and was not inclined to view matters in too sanguine a light, the board had been enabled to place the utmost reliance upon the information furnished by that gentleman, while the report he had made as to such investigations had proved a source of great guidance to the directors, and an effective guide to them in their subsequent conduct of the management of the mine. (Hear, hear.) And that Mr. Frames had gone out to Utah at great inconvenience to himself, but being fully impressed with the conviction that such a course would result to the advantage of the company. (Hear, hear.) And the board having carefully considered the subject, had since come to the conclusion that the system of occasional visits to the mine by directors was one that ought to be maintained : and judging from the benefit that had accrued to the concern from that visit of Mr. Frames, they had no objection to the system of occasional visits being continued. (Hear, hear.) It became his duty to draw the attention of the meeting to the fact that they had made some change in the board since he had appeared before the shareholders on March 25 last. Subsequent to that date Lord Robert Montagu, the former chairman of the company, had retired from the direction, and the board had been pleased to choose him (the speaker) in his place. (Loud cheers.) He could only hope that his co-directors were as satisfied with the services he rendered, and the manner in which he had discharged his duties, as was with them. (Hear, hear.) He was also, with the zealous and unanimously expressed opinion of the majority, that he should proceed in carrying on the affairs of the company to the satisfaction of the mine, and when he said that he did not by any means wish to define the limits of the company's prosperity, inasmuch he confidently anticipated that the mine as a sound and remunerative investment would outlast all their times, and eventually be handed down with undiminished success to their children. (Hear, hear, and loud cheers.) Now, he could not conclude the few observations he had to make, without expressing his warmest wishes for the success of the mine, and the honourable conduct that had characterized the vendors in all their transactions with the company.

After a slight further discussion, the resolution moving the adoption of the report and accounts was put to the meeting, and carried unanimously.

FEB. 8

LAST CHANCE SILVER MINING COMPANY.

A general meeting of shareholders was held at the London Tavern, London, on Monday, Nov. 10, 1896.—Sir A. MALET, Bart., K.C.B., in the chair.

THOMAS (the secretary) read the notice convening the meeting. The report of the directors (which appeared in last week's issue) was taken as read.

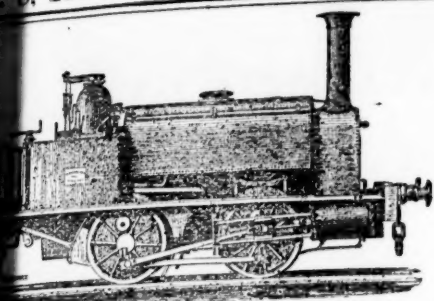
THE CHAIRMAN said the board had called attention to the circular of Nov. 1, by which the shareholders had seen that they had consented to the sale of the mine, and that at that time Mr. Maxwell had been working on the mine; in the next circular, of Nov. 15, Mr. Maxwell acquainted them that the defects in the timbers of the mines had caused a serious retardation of the work, and that he was occupying himself in necessary work on the mine was being re-timbered; he hoped at that time to return in three months, reporting that the ore was the richest in the Canyon. Some doubts, however, began to rise as to the value of the ore should be best dealt with, not from any defects in the mine, but from the character of the ore having changed. Mr. Maxwell had doubts whether it would be best reduced by stamp-mill furnaces. Those doubts were of a nature to make him pause in his advances, so the delay could not be prejudicial in any way to the interests of the shareholders. On Oct. 2, after the arrival of Mr. Frames, another circular was issued, which noted the cutting of the ore in the deep adit and Mr. Frames' arrival at the mine. Mr. Frames' arrival was coincident with that event, and a very important one it was to the future of the mine. Mr. Frames immediately reported by a telegram, which from a singular mistake in the telegram was misinterpreted into the "tunnel was loaded." The shareholders did not understand what was meant by a lode, for instead of the "tunnel being loaded" it should have been "tunnel lode." The telegram further stated that everything was satisfactory in the progress of the mine. Mr. Frames went most minutely into the accounts, and scrutinised everything, and not being an optimist in his disposition the board placed the firmest reliance in everything he said and stated; and the least he (the Chairman) could say was that Mr. Frames' visit had been of the greatest use to the directors, in guiding them in their proceedings. In the circular of Nov. 9 Mr. Maxwell complained of the delays which had taken place in the extraction of the ores entered into for the purpose of their reduction, and again expressed doubts as to whether stamping-mills or crushers would be the best process to be adopted for their reduction, and in a time announcing that it was increasing in richness, and that a lead mine should be purchased for providing flux; and did not seem to be fixed in his opinion as to the character of the ore produced. Mr. Maxwell also requested that funds should be provided for purchasing this lead mine, and the directors came to an agreement that the vendors should supply the funds for that purpose, and they had consented to do so upon very liberal terms. Mr. Maxwell had also come to an agreement for the purchase of the ore, ensuring the payment of the first dividend, which, he promised in three months, was not paid for four months from which Mr. Maxwell first fixed. The sale of the unmined ores ensured the payment of the current rate of dividends until the furnaces were completed, after which there was every prospect that the arrears from the month of August would be made up by the shareholders by larger dividends which would be able to be declared from the ore which by that time would have been accu-

those circumstances the question had arisen as to the best mode of treating it; but subsequent to the time at which it had been resolved to purchase a lead mine for the purpose of using its produce as a flux for the ores from their original mine, the character of the ore had once more changed, and the workings had now opened up into rich galena ore, and gold and silver, thus rendering the mine intrinsically more valuable at the present moment than on the day operations had been com-

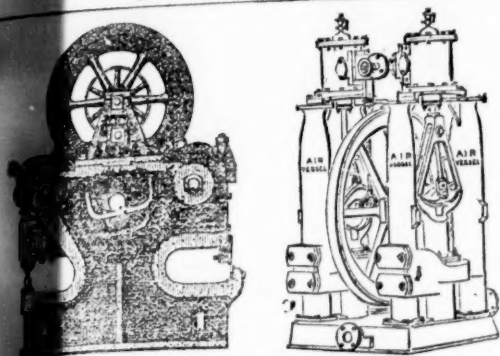
into consideration as to whether they had sufficient capital to carry out the objects of the company to a satisfactory result. After considerable deliberation, they had come to the conclusion that they had not sufficient. The members of the direction

STATISTICS OF BRITISH TIN, LEAD, AND COPPER MINES
 1872.—Under this title a well-printed sheet, compiled by Mr. J. A. S.A., the purser of East Haleswood Mine, has just been issued. It contains a list of the names of the mines, the number of shares, capital paid up, market value, dividends paid in 1871, the aggregate percentage of dividends upon the nominal paid, and upon the value of the metal produced, and location of mines. The table gives the names of the owners and lessees, and will be found very useful for reference by all concerned in the mining industry.

FEB. 8, 1873.]



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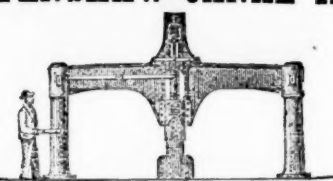
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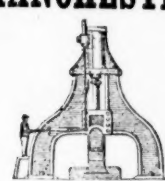
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Best Swedish Horse Nails, Back Bands, Plough Traces, Best Spring, Cast, Double Shear, and Blister Steel.

JOHN STANSFELD (late Stansfeld and Sons), Iron Merchants, Bolt
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ROYAL LETTERS PATENT.

STANLEY'S PATENT FURNACE,
FOR SMELTING ORE OR RE-MELTING IRON OR OTHER METAL,
PUDDLING AND ALL KINDS OF HEATING FURNACES.
JOHN MARTIN STANLEY, PATENTEE & SOLE LICENSOR,
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The advantages of these furnaces are, in the first place, they effect a saving of from 25 to 50 per cent. in fuel.
2ndly, The use and expense of grate-bars are dispensed with, as these furnaces have closed fire-places, formed in brickwork.
3rdly, They make from 80 to 90 per cent. less ashes than open fire-grate furnaces.
4thly, They have a purer flame, the combustion is more complete, and contains less free or unmixed air or gases.
5thly, The workmen have much less labour in working these furnaces.
6thly, They heat quicker, and are more under the control of the furnace-men.
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8thly, The mills and workshops are cooler and more comfortable than where the open fire-grate furnaces are used.

For prices, and other information, apply to J. M. STANLEY, 27, Change-alley, Sheffield.

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Manufacturer of Every Description of Railway, Colliery, and Contractors' Plant.
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THIS OIL is suitable to every kind of Machinery. As a lubricant it is equal to the best Spermaceti
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For particular kinds of Machinery, the Oil may be specially prepared of a consistency and character
adapted to the nature of the work to be done.

"I herewith certify that the Rangoon Engine Oil, manufactured by Messrs. Chas. Price and Co., is
free from any material which can produce corrosion of the metal work of machinery. It is indeed
calculated to protect metallic surfaces from oxidation.

"The lubricating power of this oil is equal to Spermaceti or Lard Oil.

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Every parcel of the Oil sent from the work bears the Trade Mark of the Firm.
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BAR IRON, STEEL, SPelter, TIN, COPPER, LEAD, SHEETS, ORES,
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ENGINEERS, SHIPBUILDERS, AND CONTRACTORS,

BLOWING ENGINES, WINDING ENGINES,

Bourne's Patent Spherical Governors, Bourne's Patent Feedwater Heaters,

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PUMPING ENGINES, STEAM BOILERS,

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SOMERVELL BROTHERS,
NETHERFIELD, KENDAL,

MANUFACTURERS OF

LEATHER HANDS, HOSE PIPES, FIRE BUCKETS,

HAND LEATHERS, BLUE BENDS, AND

THE KENDAL ENGINE BENDS,

And every description of LEATHER for ENGINEERING and
COLLIERY PURPOSES.

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FOR CONVEYING
CHARGE IN

SAFETY FUSE,

FIRE TO FIRE
BLASTING ROCKS, &c.Obtained the PRIZE MEDALS at the "ROYAL EXHIBITION" of 1851; at
the "INTERNATIONAL EXHIBITION" of 1862, in London; at the "IMPERIAL
EXPOSITION," held in Paris, in 1855; at the "INTERNATIONAL EXHIBI
TION," in Dublin, 1865; at the "UNIVERSAL EXPOSITION," in Paris, 1867;
and at the "GREAT INDUSTRIAL EXHIBITION," at Altona, in 1869.**BICKFORD, SMITH, AND CO.,**
of TUCKINGMILL, CORNWALL, MANUFACTURERS AND ORIGINAL PATENTEES OF
SAFETY FUSE, having been informed that the name of
their firm has been attached to fuse not of their manufac
ture, beg to call the attention of the trade and public to
the following announcement:—EVERY COIL OF FUSE MANUFACTURED by them has TWO SEPARATE
THREADS PASSING THROUGH the COLUMN of GUNPOWDER, and BICK
FORD, SMITH, AND CO. CLAIM TWO SUCH SEPARATE THREADS as
THEIR TRADE MARK.For Excellence
and Practical Success
of EnginesRepresented by
Model exhibited by
this Firm.**HARVEY AND CO.,**
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HAYLE, CORNWALL,

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MANUFACTURERS OF

PUMPING and other LAND ENGINES and MARINE STEAM ENGINES
the largest kind in use, SUGAR MACHINERY, MILLWORK, MINING
MACHINERY, and MACHINERY IN GENERAL.

SHIPBUILDERS IN WOOD AND IRON.

SECONDHAND MINING MACHINERY FOR SALE,
IN FIRST-RATE CONDITION, AT MODERATE PRICES.PUMPING ENGINES; WINDING ENGINES; STAMPING ENGINES
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WORK of all descriptions, and all kinds of MATERIALS required for
MINING PURPOSES.

THE PATENT PNEUMATIC STAMPS

May be SEEN AT WORK at HAYLE FOUNDRY WHARF, NINE ELMS,
by previous application at either of the above addresses.

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STAMP COFFER,



FOR STAMPING GOLD QUARTZ, TIN, AND OTHER ORES.

The gateway is extended, discharge loudly increased, and power economised.
May be inspected in full work, on application to Captain TREGAY, Redruth,
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or to SUPPLY the MACHINES.**JOHN AND EDWIN WRIGHT,**

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MANUFACTURERS OF EVERY DESCRIPTION OF
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from the very best quality of charcoal iron and steel wire.

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PATENT RECIPROCATING CRUSHER

Is the SIMPLEST and BEST PULVERISER in existence. It will do BETTER
WORK, and MORE OF IT, on same power than any other yet invented.
Apply for terms to GEORGE GIBBY, Aberystwith; or to the patentees,
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MINE SIEVE AND STAMPS' GRATE MANUFACTURERS,
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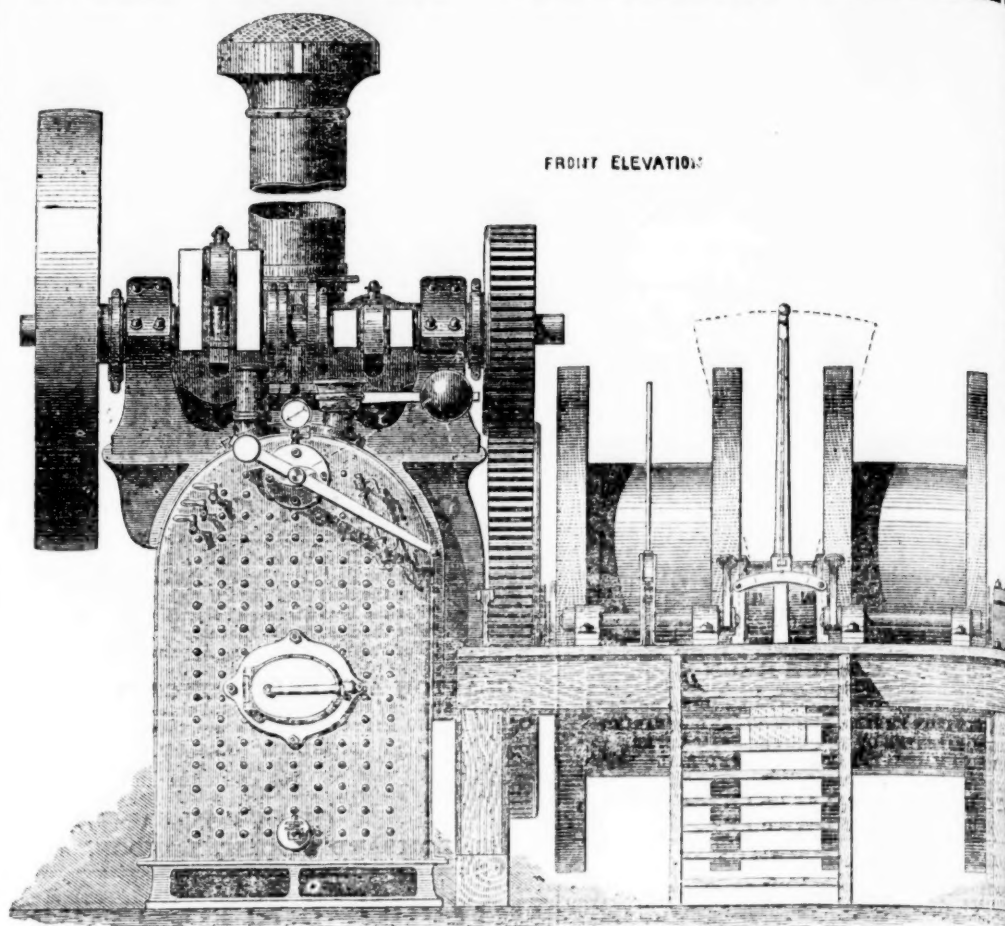
THE DON LUBRICATING OIL

IS 40 PER CENT. CHEAPER THAN ORDINARY KINDS,
AND QUITE AS GOOD AND DURABLE.It is absolutely free from the very common defect of gumming.
Mr. HEWLETT, of the Wigau Coal and Iron Company, says:—"I have used it for
two years, and find it to answer exceedingly well for lubricating purposes."
Trials may be made at our risk.

AGENTS WANTED AT HOME AND ABROAD.

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THE ROBEY MINING ENGINE

FRONT ELEVATION

FROM 20 TO 200 EFFECTIVE HORSE-POWER.

FOR FULL PARTICULARS AND PRICES, APPLY TO—

ROBEY AND COMPANY, LIMITED
PERSEVERANCE IRONWORKS, LINCOLN.

ALSO OF PATENT PORTABLE

HAULING AND WINDING ENGINEWITH
PATENT DRUM WINDLASSES,
FOR MINING PURPOSES.

This Engine is specially commended to Mining Engineers and others, as by its adoption—

Haulage along inclined drifts is easily and cheaply effected;

The expense of sinking new shafts is greatly reduced, neither foundations nor engine-house being required;

It is available not only for winding, but for pumping, sawing, &c.—a great desideratum at a large colliery;

It can be very quickly removed (being self-propelling), and fixed in any desired position.

Prices and full particulars on application as above, and also references to view the engine in successful work near Derby,
Haverfordwest, Darlington, Durham, Penzance, and other places.

THESE ENGINES WORK WITH MARVELLOUS ECONOMY IN FUEL.

WIRE TRAMWAYS

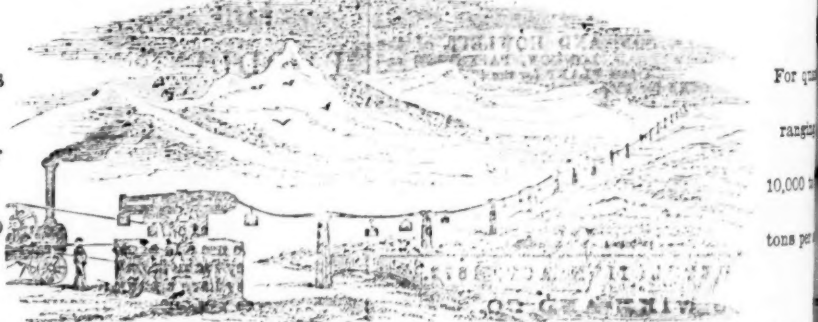
COST

(exclusive of power

and rolling-stock)

From £250 to £900

per mile,

And are at present successfully employed in lengths from a quarter of a mile to fourteen miles in transport of coal, iron
clay, coke, general mining produce, beetroot, sugar-cane, &c. They are working in most difficult and mountainous districts,
any other means of transport is impossible, as well as through ordinary country.

ABOUT SEVENTY LINES HAVE ALREADY BEEN CONSTRUCTED.

THE WIRE TRAMWAY COMPANY

(LIMITED)

Are PREPARED to SURVEY and ESTIMATE for LINES and EXECUTE CONTRACTS at HOME and ABROAD.
engineers employed in constructing these lines in England, Holland, Prussia, Austria, Russia, Italy, Spain, United States,
River Plate, India, Bolivia, West Indies, and Egypt. The system has been adopted by the English and Anglo-Indian
the Spanish and Prussian Governments, and for many of the first mines and ironworks at home and abroad.**WIRE TRAMWAY COMPANY (Limited), 21, Gresham-street,****FRANCIS MORTON & CO., LIMITED, LIVERPOOL**

Manufacture, in Galvanised and Corrugated Iron,

IRON ROOFS, IRON BUILDINGS, IRON SHEETS

Which they have extensively supplied and erected for mining requirements at home and abroad.

ESTIMATES FURNISHED ON RECEIPT OF PARTICULARS.

F. M. & CO'S PATENT IRON ROOFING TILES OR SLATES**SPECIAL FAVOUR FOR TEMPORARY COVERING,**

They require considerably less framework to carry them than ordinary slates or tiles.

ILLUSTRATED CATALOGUE ON APPLICATION.

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FEB. 8, 1873.]

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THE "BURLEIGH" ROCK DRILL.

PRIZE MEDALS:

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Liverpool and Manchester Agricultural
Show, Sept. 12, 1872.

Middleton Agricultural Show,
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AND

SOLE PROPRIETOR.

SPECIALLY APPLICABLE

FOR

DRILLING, QUARRYING,

AND

MINING PURPOSES.



Machine and Stand for
DRILLING AND SINKING.

This celebrated ROCK DRILL, which by reason of its inherent
strength has superseded all other Rock Drills, is now in extensive
use in America, England, Scotland, and the Continent, and is in-
valuable in the economic working of all Mines, Quarries,
creeks, shafts, &c.

After many trials of other machinery, it was found to be the
only machine by which the greatest engineering work of the age
the House Tunnel in America—could be accomplished.

Its advantages are as follows:—

First,—It does not get out of order.

Second,—It drills through Aberdeen granite at the incredible
rate of 10 inches per minute.

Third,—Independent of the enormous saving effected in the
cost of the machine, such as pumping, ventilation, interest of capital,
from the fact of the "put out" being increased fourfold, the
economy, compared with hand labour in actual drilling, is very
considerable.

Fourth,—The saving in steel alone is considerable,—
it will go through 20 feet of Aberdeen granite without
opening.

For testimonials, estimates, and other information, apply to—

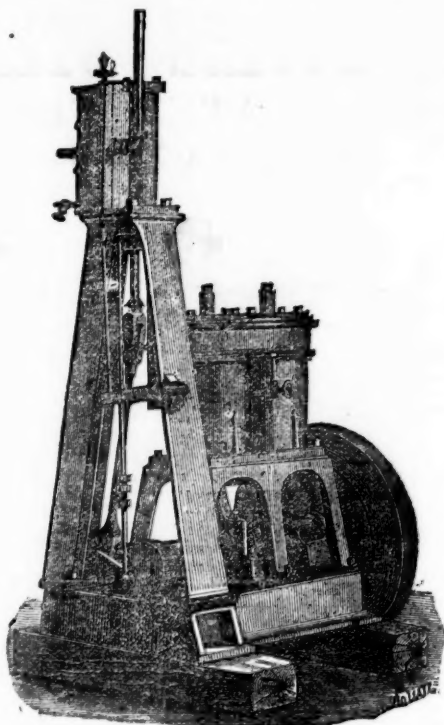
T. BROWN & CO., Engineers, 96, Newgate-street, London, E.C.

**GRAVEN BROTHERS, Engineers (the Makers), Vauxhall Ironworks,
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**WILSON, McLAY, & CO., Sole Agents, 2, Talbot-court, Gracechurch-
street, London, E.C.; and 87, St. Vincent-street, Glasgow.**

THE "BURLEIGH" AIR COMPRESSOR,

For DRIVING the "BURLEIGH" DRILL, PUMPS, or other
MACHINERY, where air power is necessary.



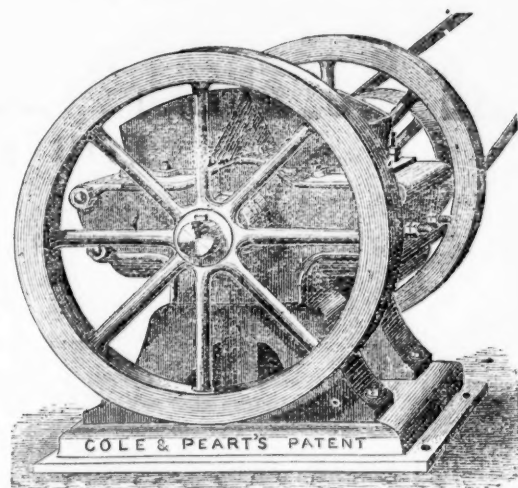
The peculiar advantages which enhance the value of this machine
in the estimation of those who have it in practical use are—

First,—Its compactness compared with its power.

Second,—That by a nice adjustment of the cranks in the rela-
tion to each other the greatest power of the engine is applied at
the exact point of the greatest resistance, so as to produce the
best results at the least cost.

Third,—Heating of the piston and other parts is reduced to the
minimum.

THE STONE BREAKER AND QUARTZ CRUSHER.



Messrs. T. BROWN and CO. have the pleasure of introducing
the improved machinery of Messrs. COLE and PEART for stone-
breaking and quartz-crushing machinery, for crushing, grinding,
and triturating stone, flint, cement, minerals, ores, chemicals, &c.,
and for washing and separating metals from ores, and extracting
gold from quartz. This machine accomplishes considerably more
work, and costs less than any other similar machine. An import-
ant feature in it is by that a double action it produces road metal
and fine stuff for mortar simultaneously, or it can be adjusted to
break or crush to any required size.

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STREET, E.C.;

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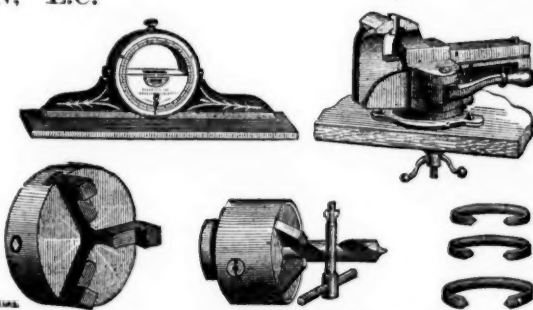
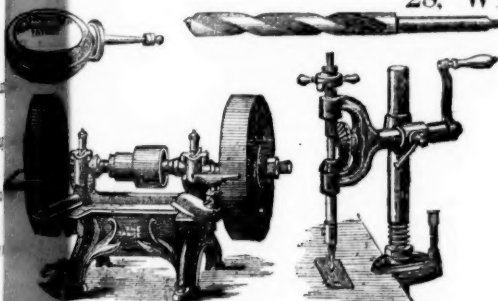
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SOLE AGENTS FOR

Morse's Twist Drill, and Machine Company's celebrated Twist
Drills and Chucks; American Scroll Chucks; Stephens' Patent
Vices; Parker's Patent Parallel and Swivel Vices; Gould Manu-
facturing Company's Well and Cistern Pumps; Washita, Arkansas,
and Hindostan Oil Stones; and all other descriptions of American
Tools and Machinery, &c., &c.

C. C. and Co. are prepared to give quotations and execute in-
dents for American Goods of all descriptions, to be shipped to any
port.

CATALOGUES AND PRICES CURRENT ON APPLICATION.



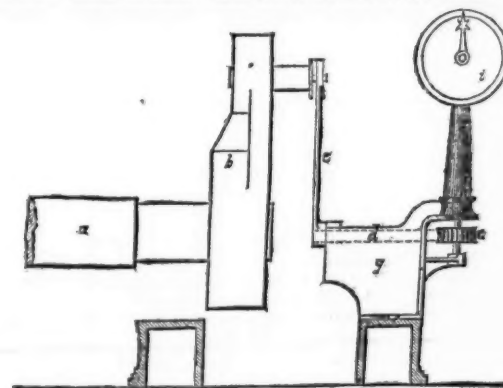
PEPPER MILL BRASS FOUNDRY COMPANY, DARLINGTON STREET, WIGAN, COLLIERY FURNISHERS, BRASS FOUNDERS, COPPERSMITHS, & GAS METER MANUFACTURERS,

The PEPPER MILL BRASS FOUNDRY COMPANY beg respectfully
to invite attention to their IMPROVED SELF-REGISTERING COL-
LIERY WINDING INDICATOR, which, in addition to its ordinary use
of indicating the position of the load in the shaft, registers the number of
windings, thus enabling the manager at a glance, and at any moment, to
check the return of the bankman or tallyman, by reading off from the
dial the number of windings for any stated time.

This Indicator is especially adapted for Water Winding or Pumping. Its
indications cannot possibly be tampered with, and unerringly show the
number of windings or strokes for any stated period, so that it will at once
be seen whether or not the person in charge has been fully discharging his
duty.

These Winding Indicators are supplied either with or with-
out the Self-registration Dial.

The Pepper Mill Brass Foundry Company will be glad to furnish, on ap-
plication, sets of drawings illustrative of the simplest and cheapest mode
of attaching their indicators to engines of various constructions, either
vertical or horizontal.



One mode of attaching Indicator to horizontal engine.

These Indicators have been supplied to most of the principal Collieries in Lancashire, including Wigan Coal and Iron Co. (Limited); Ince Hall Coal and
Iron Co. (Limited); Messrs. Jonathan Blundell and Son; John Grant Morris, Esq.; Messrs. Pearson and Knowles; Messrs. Andrew Knowles and Sons;
and Rugeley; Mostyn Coal and Iron Co.; Messrs. Pilkington Bros., St. Helens.

TANGYE BROTHERS AND HOLMAN

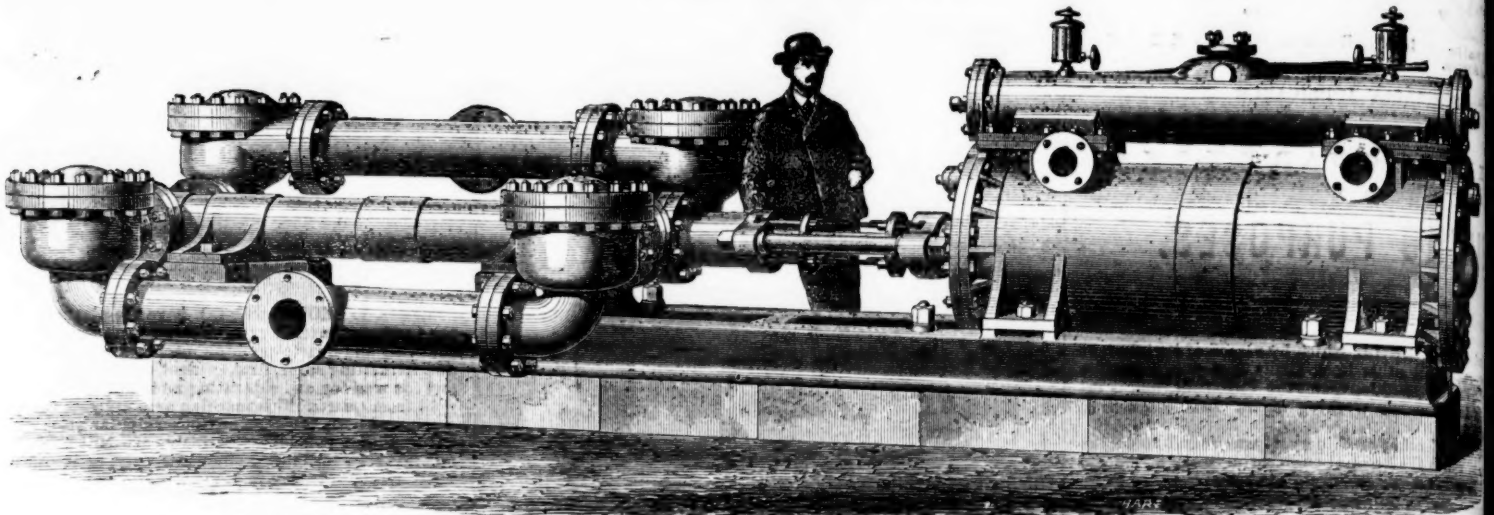
10, LAURENCE POUNTNEY LANE, LONDON,

CORNWALL WORKS (TANGYE BROTHERS), BIRMINGHAM,
NEWCASTLE-ON-TYNE (TANGYE BROTHERS AND RAKE), OFFICES AND WAREHOUSE, ST. NICHOLAS' BUILDINGS,
SOLE MAKERS OF

THE "SPECIAL" DIRECT-ACTING STEAM PUMPING ENGINE

FOR FORCING WATER FROM MINES.

Nearly 3000 in Use.



The "SPECIAL" Direct-acting Steam Pumping Engines require no costly Engine Houses or foundations, no repetition of Plunger Lifts, ponderous Connecting-rods, or complication of Pitwork allow a clear shaft for hauling purposes.

Extract from "ENGINEERING," September 6th, 1872:—

"The accompanying engraving illustrates a large specimen of the 'Special' Steam Pump, which was brought before the public about four years since by Messrs. Tangye Brothers and Holman. The Pump is the invention of Mr. S. Cameron, of New York, and since its introduction Messrs. Tangye have turned out nearly 3000 from their works.

"These pumps are of various sizes, and at first only small ones were made, but as their usefulness became developed the manufacturers designed pumping engines on the same principle for use in collieries. They were first applied to this purpose in the Newcastle collieries about three years since, and through the efforts of the late Mr. A. Stansfield Rake, under the direction of Messrs. Tangye, about 130 of these pumps had been introduced—principally in the collieries of the Durham and Newcastle districts, up to the end of 1870. They were adapted to perform the required duty—varying in almost every case—of forcing from 1000 to 10,000 gallons per hour from depths ranging from 100 to 500 ft. The success of this system of pumps led Mr. J. Bigland, the manager of Messrs. Pease's Bishop Auckland Collieries, to conclude that it was adapted for yet heavier work. The result of his investigations into its working led to the manufacture of the engine we have illustrated, for the Adelaide Collieries, belonging to Messrs. Pease, at Bishop Auckland.

"The construction of the Special Steam Pump is so well known

that we need now do no more than refer to the dimensions of the various parts. The steam cylinder is 26 in. diameter, and the pump—which is double acting—is 6½ in. diameter, with a 6-ft. stroke. The slide valve is steam-moved, and its alternate action is effected by means of two steel reversing valves, operated by the piston in the interior of the cylinder at either end. Hence there is no external mechanism except the piston rod, a few inches only of which is seen reciprocating between the stuffing boxes of the steam and pump cylinders. In the contract it was stipulated that the engine should raise 120 gallons per minute 1040 ft. high in a single lift, and this is more than accomplished, with apparently as much ease as if its load was delivered at only 100 ft. high.

"The engine-room at the Adelaide Collieries is situated at a depth of 1040 ft. below the surface, and is an arched chamber, about 100 ft. long by 20 ft. wide, and 10 ft. high at centre. At the far end of this chamber is a double-flued boiler, 27 ft. long and 7 ft. in diameter. Placed between the boiler and the shaft is the pumping engine we have been describing. It was started on June 6, 1871, and Mr. Bigland reported that, having measured its duty, he found the average of seven trials to be 137 gallons per minute, thus giving a higher duty than was stipulated for in the contract.

"A still larger Special Steam Pump than the one already described

has since been made by Messrs. Tangye for Messrs. Pease's collieries, Silverdale, Staffordshire. The steam cylinder is 32 in. in diameter, and the water cylinder 10½ in. diameter, and the engine has to raise 22,500 gallons per hour. Two out of eight engines for some extensive coal mines are also in a forward state; each of these engines is of raising 150 gallons per minute, or 9000 gallons per hour. This system of underground pumping engine carries with it the recommendations of simplicity and with a small number of mechanical parts. Its first use was moderate, as compared with the method of raising water depths by a series of 40 or 50 ft. lifts. Its practicality was tested in 1867 by the award of a silver medal by the Polytechnic Society, which is composed chiefly of miners. In fact, these engines appear to solve a very important question in mining operations—viz., the most economical means of deep mine drainage. Their success has been established in the coal mines of Durham and Newcastle, and reason why their adoption should not follow, as seen in the copper and tin mines of Cornwall, some of which are at depth; and especially for foreign mines, where economy and economy are of paramount consideration."

The "Special" Steam Pumping Engines are in use at the following among many other Collieries:—

Adelaide Colliery, Bishop Auckland.....	3 Pumps.	North Bitchburn Colliery, Darlington.....	2 Pumps.	Stott, James and Company, Burslem	
Acomb Colliery, Hexham	1 "	Newton Cap Colliery, Darlington	1 "	Straker and Love, Brancepeth Colliery	
Blackfell Colliery, Gateshead	1 "	Normanby Mines	1 "	Seaton Delaval Coal Colliery, near Newcastle	
Black Boy Colliery, Gateshead	1 "	Oakenshaw Colliery	1 "	Thornley Colliery, Ferryhill	
Castle Eden Colliery	2 "	Pease's West Colliery	2 "	Thompson, John, Gateshead	
Carr, W. C., Newcastle	4 "	Pease, J. and J. W., near Crook	5 "	Trimdon Grange Colliery	
Etherley Colliery	1 "	Pease, J. and J., Brandon Colliery	1 "	Tudhoe Colliery	
Gidlow, T., Wigan	3 "	Pegwood Colliery, near Morpeth	2 "	Vobster and Mells Colliery	
Haswell, Shotton and Easington Coal Company	3 "	Pelton Fell Colliery	1 "	Whiddrington Colliery, Morpeth	
Lochelly Iron and Coal Company	2 "	Railey Fell Colliery, Darlington	1 "	Whitworth and Spennymoor Colliery	
Lochore and Capeldrae Cannel Coal Company	6 "	Right Hon. Earl Durham, Fence Houses	1 "	Westerton Colliery, Bishop Auckland	
Leather, J. T., near Leeds	2 "	Skelton Mines	1 "	Wardley Colliery, Gateshead	
Lumley Colliery, Fence Houses	1 "	South Benwell Colliery	5 "	Westminster Brymbo Coal Company	
Monkwearmouth Colliery, Sunderland	1 "	St. Helens (Tindale) Colliery	1 "	Weardale Coal and Iron Company	

PARTICULARS OF THE "SPECIAL" STEAM PUMPING ENGINES SUITABLE FOR HIGH LIFTS IN MINES.

Diameter of Steam Cylinder	6	8	10	12	16	10	14	18	21	14	18	21	26	16
Diameter of Water Cylinder	3	3	3	4	4	5	5	5	5	6	6	6	6	7
Length of Stroke	24	24	36	24	36	48	24	36	36	48	36	36	48	72
Strokes per minute	50	30	20	30	20	15	30	20	20	15	20	20	15	10
Gallons per hour	2,200	2,200	2,200	3,900	3,900	3,900	6,100	6,100	6,100	6,100	8,800	8,800	8,800	11,900
Height in feet to which water can be raised with 40 lbs. pressure per square inch of steam at pump.....	240	425	665	240	540	960	240	470	775	1,058	330	540	740	312
Diameter of Suction and Delivery ..Inches	2	2	2	3	3	3	3½	3½	3½	4	4	4	4	5
Diameter of Steam Inlet ..Inches	¾	1½	1½	1½	2½	2½	1½	2½	3	3½	2½	3	3½	2½
Diameter of Exhaust	1	1½	1½	1½	2½	3	1½	2½	3½	4	2½	3½	4	3